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Short communication

O 031 - Postural strategy for mediolateral weight shifting in healthy adult

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ABSTRACT

Mediolateral weight shifting (MLWS) strategy has not been fully described in healthy populations and doing so would guide the clinician to give meaningful feedback. The aim of this paper is to characterize visually guided MLWS with a home-made game coupling a Kinect and a Wii Balance Board. In this project, 10 healthy adults were asked to catch water drops falling from the top of a screen using COF displacement. The task was divided into 4 levels of two conditions, namely “speed” and “amplitude” for a total of 250 MLWS per subject. This study reports the postural strategy used to perform MLWS tasks at different speed and amplitude in healthy adults. Results highlight modifications of the spatial and temporal parameters of the trunk movement.

1. Introduction

The ability to control mediolateral weight shifting (MLWS) is crucial in many functional tasks and therefore it is frequently trained in rehabilitation. It is known that people with lower limb motor impairment have difficulties performing MLWS and use compensatory strategy [1], but, MLWS strategy has rarely been described in healthy population. A better understanding of the postural strategy used to perform MLWS could guide the clinician to correct inadequate MLWS in patients with motor limitations.

2. Research question

The aim of this paper is (1) to describe the strategy used to perform visually guided MLWS in healthy adults.

3. Methods

To evaluate MLWS ability, a home-made game console coupling a Kinect camera and a Wii Balance Board was used [2]. The goal of the game was to catch water drops falling from the sky. The participant had to catch the water drop with a bowl displayed on a screen, which was controlled through lateral displacement of the center of force (CoF). The movement was recorded by the Kinect camera. Mid-Shoulder joint (MSjt), SpineBase joint (SBjt) and CoF displacement were used to assess dynamic postural adjustment. The participant had to perform MLWS in two conditions. In the first one, namely “amplitude”, the distance between the center of the scene and water drop increased (25%, 50%, 75% and 100% of the base of support (BOS) width) while the speed remained stable. In the second condition, namely “speed”, the amplitude remained stable (50% of the BOS) and the speed of the water drop increased (4 levels). Ten healthy adults completed 250 MLWS. Repeated ANOVAs were performed to evaluate the effect of conditions on MSjt, SBjt and CoF displacement. The variables retained for analysis are illustrated on Fig. 1.

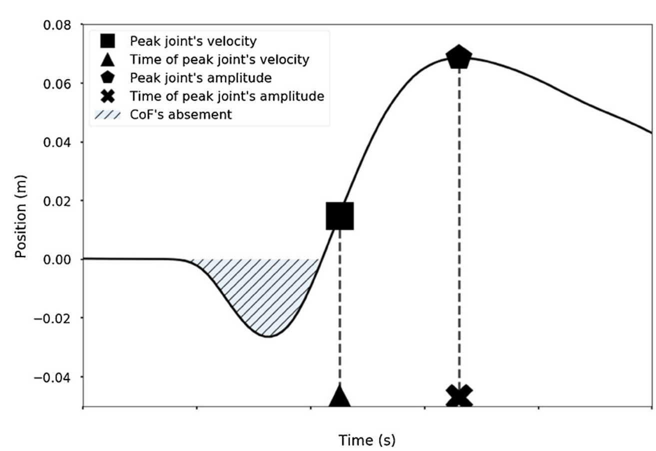

Fig. 1. Representation of the variables retain for analysis.

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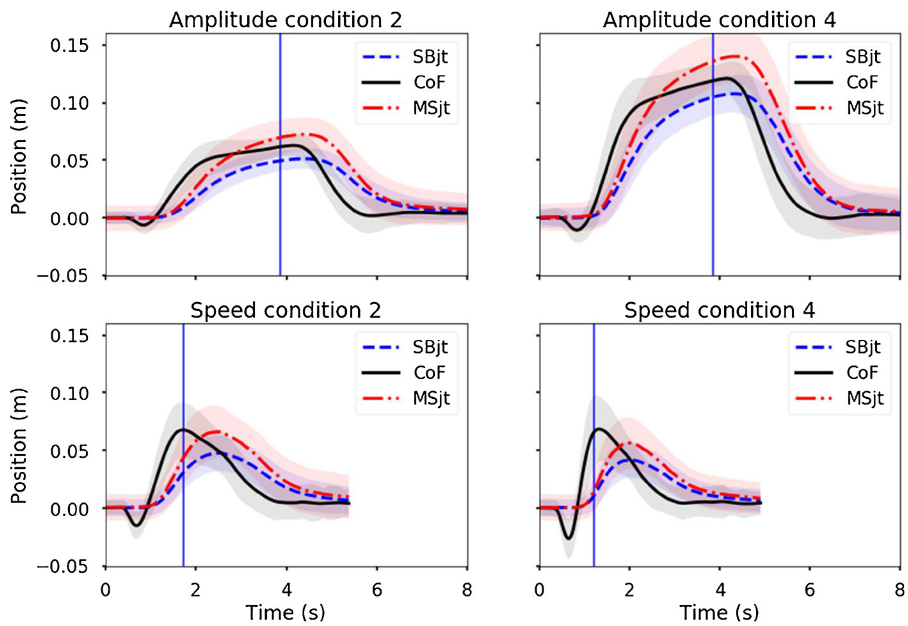

Fig. 2. Representation of 10 participants' mean displacement for CoF, SBjt, MSJt of 30 MLWS in 4 conditions. At second 0 is the appearance of the drop at the top of the screen and the vertical line its disappearance.

4. Results

In the amplitude condition, speed and amplitude of SBjt and MSjt displacement increased with the increased of CoF displacement ($p < 0.05$). The time of MSjt, SBjt and CoF maximal velocity did not change with amplitude modifications, whereas the time of peak amplitude changed ($p < 0.05$). CoF absement also increased with amplitude, excepted between 75% and 100% of the BOS. In speed condition, CoF absement increased with the two higher speeds. MSjt speed and amplitude did not change with increase of speed, but the time of peak velocity decreased between the lower speed and the others ($p < 0.05$). SBjt peak amplitude increased with speed ($p < 0.05$) (Fig. 2).

5. Discussion

This study reports the postural strategy used to perform MLWS tasks at different speed and amplitude in healthy adults. The results highlight modifications of the spatial and temporal parameters of the trunk movement. Based on these results further analysis is required to improve the understanding of MLWS control.

References

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